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## DESCRIPTION

Data Transmitting Apparatus and Data

Transmitting Method

Technical Field

5           The present invention relates to a data transmitting apparatus and a data transmitting method for transmitting data having contents data of video data, audio data, and so forth of for example a digital satellite broadcast.

10          Related Art

Many techniques have been proposed as data delivering systems. For example, on the Internet, data is delivered using WWW (World Wide Web) corresponding to HTTP (Hyper Text Transfer Protocol). To search  
15          desired data from a huge amount of data collection of WWW (World Wide Web), the use of meta data is becoming common. The meta data contains a data structure. As an example of systems that selectively receive data corresponding to meta data from WWW, PICS (Platform for  
20          Internet Content Selection) and RDF (Resource Description Framework) have been proposed.

In a digital broadcast, meta information such as a program title and broadcast time data that are structural elements of EPG (Electronic Program Guide)  
25          are transmitted in the format of EIT (Event Information Table). Information of EPG is represented as a section type table referred to as SI (Service Information). A

receiver extracts relevant information from the table and displays the extracted information on its screen. With EPG, the user can select data as programs from successive broadcast data.

5                   Although a digital broadcast is mono-directionally transmitted to a very large number of terminal units, a large amount of data can be simultaneously transmitted. Thus, it is advantageous to merge a digital broadcast and a network. In  
10 reality, meta information is added to contents data on the Internet or contents data of a digital broadcast.

                  The format of meta information of a digital broadcast (for example, EIT) is not compatible with the format of meta information of a conventional network  
15 such as the Internet. To solve this problem, both types of meta information are used as they are. However, in a system using WWW such as PICS or RDF, since meta information is represented in a text format, the transmission efficiency is not high. In addition,  
20 to selectively receive meta information through a broadband broadcast network, the receiver side should filter received data at high speed. However, in the text format, it is difficult to filter received data at high speed.

25                   On the other hand, meta information such as EIT of a digital broadcast has a dedicated format. The meta information is transmitted using predetermined

descriptors. In other words, a converting method for converting meta information such as EIT into data corresponding to WWW has not been defined. In addition, a method for transmitting flexible meta information such as PICS or RDF corresponding to the MPEG system used in a digital broadcast and a format that represents meta information have not been defined.

To solve these problems, a method for converting such meta information into a format suitable for a digital broadcast has been proposed in a prior patent application (Japanese Patent Application No. Hei 10-170397). In other words, in the prior patent application, as with EPG, meta information corresponding to a RDF model is contained as a section type table referred to as SI.

In recent years, in a transmission format of additional information for contents data, a descriptive method for adding meta information and a meta information schema (referred to as description and description scheme, respectively, in the MPEG 7 standard) has been studied so as to effectively search digital video data and audio data.

To add the meta information and meta information schema to digital broadcast data that is delivered and provide a search service using the meta information and meta information schema, it is necessary to effectively transmit the meta information

and meta information schema.

In the conventional method, since the transmission format of the meta information is different from the transmission format of the meta information schema, the transmitter side should separately perform an encoding process for the meta information and meta information schema, whereas the receiver side should separately perform a decoding process for the meta information and meta information schema. Thus, the processes are not effectively performed on the transmitter side and the receiver side.

#### Disclosure of the Invention

Therefore, an object of the present invention is to provide a data transmitting apparatus and a data transmitting method for transmitting meta information and a meta information schema that are converted in the same transmission format so as to allow the transmitter side to highly effectively transmit the meta information and the receiver side to highly effectively receive the meta information.

The present invention is a data transmitting apparatus for transmitting data having contents data that is delivered, comprising a meta information storing means for storing meta information that is a description of the contents data to be transmitted, a meta information schema storing means for storing a

data structure of the meta information, a transmission  
information converting means for converting the meta  
information stored in the meta information storing  
means and the meta information schema stored in the  
5 meta information schema storing means into information  
in a transmission format, and a transmitting means for  
transmitting an output of the transmission information  
converting means.

10 In addition, the present invention is a data  
transmitting method for transmitting data having  
contents data that is delivered, comprising the steps  
of storing meta information that is a description of  
the contents data to be transmitted, storing a data  
structure of the meta information, converting the meta  
15 information stored at meta information storing step and  
the meta information schema stored at meta information  
schema storing step into information in a transmission  
format, and transmitting an output at transmission  
information converting step.

20 According to the present invention, a meta  
information schema and meta information can be  
transmitted in the same transmission data format.

#### Brief Description of Drawings

25 Fig. 1 is a block diagram for explaining the  
overall structure of an embodiment of the present  
invention; Fig. 2 is a block diagram for explaining the  
structure of a particular portion of the embodiment of

the present invention; Fig. 3 is a block diagram for explaining the structure of another particular portion of the embodiment of the present invention; Fig. 4 is a schematic diagram showing examples of meta information schemes and meta information represented corresponding to an RDF data model; Fig. 5 is a schematic diagram showing an example of a conversion to an MPEG-2 section table format; and Fig. 6 is a schematic diagram showing another example of a conversion to an MPEG-2 section table format.

#### Best Modes for Carrying out the Invention

Next, with reference to Fig. 1, the overall structure of the embodiment of the present invention will be described. Information providers 101<sub>1</sub>, 101<sub>2</sub>, ... each have a database. The database stores contents data, meta information schemas that represent the structures of meta information of the contents data, and meta information corresponding to the contents data. The contents data is for example WWW pages. The information providers 101<sub>1</sub>, 101<sub>2</sub>, ... are connected to a broadcasting station 102 and receiving terminal units 103<sub>1</sub>, 103<sub>2</sub>, .... through a bidirectional network 105. The information provider 101 can supply contents data, meta information schemas, and meta information to the receiving terminal units 103<sub>1</sub>, 103<sub>2</sub>, .... through the bidirectional network 105.

The broadcasting station 102 has a database

that stores contents data, meta information schemas that represent the structures of meta information of the contents data, and meta information corresponding to the contents data. The contents data is for example broadcast programs. The broadcasting station 102 is connected to the receiving terminal units 103<sub>1</sub>, 103<sub>2</sub>, ... through a broadcasting network 104. The broadcasting station 102 can supply the contents data, the meta information schema, and the meta information to the receiving terminal units 103<sub>1</sub>, 103<sub>2</sub>, .... In addition, the broadcasting station 102 can receive contents data, a meta information schema, and meta information from the information provider 101 through the bidirectional network and deliver them to the receiving terminal units 103<sub>1</sub>, 103<sub>2</sub>, ... through the broadcasting network 104. Real examples of the broadcasting station 102 are a broadcasting satellite of a digital satellite broadcast and a broadcasting station of a digital ground wave satellite broadcast.

According to the present invention, a transmitting process for contents data, a meta information schemas, and meta information and a receiving process thereof are effectively performed. When contents data is a broadcast program, meta information is additional information such as "program title: seven o'clock news", "program genre: news", and "broadcast time: 7:00 to 7:30". A meta information

schema defines the structure of meta information. A meta information schema is not limited to one type. In other words, a meta information schema varies corresponding to the type of contents data and a condition such as an age.

When contents data is a broadcast program, the meta information schema defines that meta information is composed of "program title", "program genre", "broadcast time", "parental guide", and so forth. When contents data is a data broadcast, the meta information schema defines that meta information is composed of "program name", "program genre", "applicable OS", and so forth. Since there are a plurality of meta information schemas, information for correctly identifying a meta information schema corresponding to meta information is transmitted along therewith so that the receiving terminal units 103<sub>1</sub>, 103<sub>2</sub>, ... correctly recognize the meta information schema corresponding to the meta information.

Fig. 2 shows an example of the structure of a particular portion of the broadcasting station 102. The particular portion performs a process for transmitting contents data, meta information, and a meta information schema. The meta information schema is input through a meta information schema input portion 201, supplied to a meta information schema storing portion 202, and stored thereto. On the other



hand, the meta information is supplied to a meta  
information input portion 203. The meta information  
schema stored in the meta information schema storing  
portion 202 is supplied to the meta information input  
portion 203.

The meta information input portion 203  
converts the supplied meta information into data in a  
data structure corresponding to the meta information  
schema stored in the meta information schema storing  
portion 202. Thus, meta information in the data  
structure corresponding to the meta information schema  
stored in the meta information schema storing portion  
202 is stored to the meta information storing portion  
205. As was described above, since there are a  
plurality of meta information schemas, it is necessary  
to identify them. Thus, when meta information is  
stored to the meta information storing portion 205, a  
meta information schema identifier for identifying a  
meta information schema is added to meta information.

The meta information schema storing portion  
202 and the meta information storing portion 205 supply  
a meta information schema and meta information to a  
meta information schema - meta information encoding  
portion 204. The meta information schema - meta  
information encoding portion 204 converts the supplied  
meta information schema and meta information into them  
in a predetermined transmission format such as an MPEG-

2 section table format. The descriptive format of the meta information schema stored in the meta information schema storing portion 202 may vary for each contents data or each of the information providers 101<sub>1</sub>, 101<sub>2</sub>, ... However, the meta information schema - meta information encoding portion 204 outputs a meta information schema in only one transmission format. Likewise, the descriptive format of meta information stored in the meta information storing portion 205 may vary for each contents data or each of the information providers 101<sub>1</sub>, 101<sub>2</sub>, ... However, the meta information schema - meta information encoding portion 204 outputs meta information in only one transmission format.

An output signal of the meta information schema - meta information encoding portion 204 is supplied to a transmitting portion 206. In addition, contents data stored in a contents data storing portion 207 is supplied to the transmitting portion 206. The transmitting portion 206 multiplexes the meta information schema and meta information that are in the transmission format and that are output from the meta information schema - meta information encoding portion 204 with the contents data that is supplied from a contents data storing portion 207. The multiplexed signal is transmitted to the broadcasting network 104 and so forth. The contents data storing portion 207

temporarily stores contents data supplied from the information providers 101<sub>1</sub>, 101<sub>2</sub>, .... as well as contents data generated by the broadcasting station 102.

5           The structure of the portion that performs the process for transmitting contents data, meta information, and a meta information schema and that is disposed in the information providers 101<sub>1</sub>, 101<sub>2</sub>, ... may be the same as the structure shown in Fig. 2.

10          However, in this case, the transmitting portion 206 that transmits contents data, meta information, and a meta information schema to the broadcasting network 104 is omitted.

15           Fig. 3 shows an example of the structure of a portion that performs a process for receiving contents data, meta information, and a meta information schema and that is disposed in the receiving terminal units 103<sub>1</sub>, 103<sub>2</sub>, .... Contents data, a meta information schema, and meta information are input to a receiving

20          portion 301 through the broadcasting network 104 or the like. The receiving portion 301 supplies the meta information schema and the meta information to a meta information schema - meta information decoding portion 302. In addition, the receiving portion 301 supplies

25          the contents data to a contents data storing portion 308. The meta information schema - meta information decoding portion 302 decodes the meta information

schema and the meta information. The decoded meta information schema and meta information are supplied and stored to a meta information schema storing portion 303 and a meta information storing portion 304, respectively. On the other hand, the contents data storing portion 308 stores the supplied contents data.

The users of the receiving terminal units 103<sub>1</sub>, 103<sub>2</sub>, ... input user profile information corresponding to desired information through an input portion 307. The user profile information is supplied to a searching portion 306. The searching portion 306 reads a meta information schema and meta information from the meta information schema storing portion 303 and the meta information storing portion 304 and selects meta information corresponding to the user profile information. The interpretation of such meta information (namely, a process for affecting data received as meta information to a searching process with reference to a meta information schema and so forth) can be more effectively performed since the transmission format of the meta information schema is the same as the transmission format of the meta information. The meta information selected by the searching portion 306 is supplied to an output portion 309. The output portion 309 reads contents data corresponding to the selected meta information from the contents data storing portion 308 and outputs the

contents data. Thus, the user of the receiving terminal unit can obtain desired information.

Fig. 4 shows examples of a meta information schema and meta information represented corresponding to an RDF data model. A connection relation of nodes represented by ellipses and character strings in rectangles added to oriented segments between nodes is converted into data in an MPEG-2 section table format by the meta information schema - meta information encoding portion 204 and transmitted.

Fig. 5 shows an example of a conversion to the MPEG-2 section table format. In Fig. 5, identification numbers (node\_id) and names (node\_name) of individual nodes shown in Fig. 4 are successively listed. In Fig. 5, nodes having a connection relation with other nodes denoted by oriented segments contain a connection relation (relation) and a node identification number (ref\_node) connected to an oriented segment. In such a manner, a meta information schema and meta information can be converted into data in the same format and stored in the same table. Thus, on both the transmitter side and the receiver side, it is not necessary to dispose encoders and decoders corresponding to individual meta information schemas and meta information. Thus, the transmitter side and the receiver side can use one encoder and one decoder, respectively. In other words, with the meta

information schema - meta information encoding portion 204 shown in Fig. 2 and the meta information schema - meta information decoding portion 302 shown in Fig. 3, meta information can be accurately handled.

5                    Fig. 6 shows another example of a conversion to the MPEG-2 section table format. In this example, a meta information schema and meta information are stored in different tables whose formats are the same. Each table has an identifier (table\_type) that represents  
10                   which of meta information schema or meta information has been stored. In Fig. 6, the first line of the top table contains "table\_type : schema" that represents that this table contains a meta information schema. On the other hand, the first line of the bottom table contains "table\_type : metadata" that represents that this table contains meta information. In this  
15                   descriptive method, the receiving terminal units 103<sub>1</sub>, 103<sub>2</sub>, ... can identify for example meta information schemas corresponding to identifiers without need to  
20                   process the entire table.

                  It should be noted that the present invention is not limited to the above-described embodiment. In other words, it should be understood by those skilled in the art that the foregoing and various other  
25                   changes, omissions, and additions in the form and detail thereof may be made therein without departing from the spirit and scope of the present invention.

